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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/583,252

Applicant(s)

KUKI ET AL.

Examiner

Kevin Quarterman

Art Unit

2889

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☒ Claim(s) 1,3 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/5508)
Paper No(s)/Mail Date 0606
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claims 1, 3, and 12 are objected to because of the following informalities:
Independent claim 1 recites "the center electrode" in line 8 and line 9 of the claim. It appears that each of these recitations should be replaced with "the rod-shaped center electrode" for consistency in claim terminology.
2. Independent claim 1 also recites "the insulator" in line 3, line 5, and line 10 of the claim. It appears that this recitation should be replaced with "the tubular insulator" for consistency in claim terminology.
3. Claim 3 recites "the insulator" in lines 1-2 and line 6 of the claim. It appears that this recitation should be replaced with "the tubular insulator" for consistency in claim terminology.
4. Claim 12 recites "the center electrode" in line 2 of the claim. It appears that this recitation should be replaced with "the rod-shaped center electrode" for consistency in claim terminology.
5. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
7. Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 1 recites the limitation "the gap" in line 13 of the claim. There is insufficient antecedent basis for this limitation in the claim. Independent claim 1 recites a "spark discharge gap" in line 8 of the claim and also recites "a gap" in line 11 of the claim.

Thus, it is unclear which *gap* is being referred to line 13 of the claim. For purposes of examination, the Examiner interprets "the gap" in line 13 of the claim to be referring to the gap recited in line 11 of the claim, since this interpretation appears to be consistent with applicant's disclosure.

9. Independent claim 1 also recites "an outer diameter" in line 2 of the claim. It is unclear which element of the claim this *outer diameter* refers to—e.g., the *outer diameter* of the spark plug, the *outer diameter* of the tubular insulator, the *outer diameter* of the through hole, or the *outer diameter* of the insulator stepped portion. For purposes of examination, the Examiner interprets the "outer diameter" recited in line 2 of the claim to be referring to the outer diameter of the tubular insulator, since this interpretation appears to be consistent with applicant's disclosure.

10. Independent claim 1 also recites "a front end side" in lines 2-3 of the claim. It is unclear which element of the claim this *front end side* refers to—e.g., the *front end side* of the spark plug, the *front end side* of the tubular insulator, the *front end side* of the through hole, or the *front end side* of the first insulator stepped portion. For purposes of examination, the Examiner interprets the "front end side" recited in lines 2-3 of the claim to be referring to the front end side of the tubular insulator, since this interpretation appears to be consistent with applicant's disclosure.

11. Independent claim 1 also recites "an inner diameter" in line 4 of the claim. It is unclear which element of the claim this *inner diameter* refers to—e.g., the *inner diameter* of the spark plug, the *inner diameter* of the tubular insulator, the *inner diameter* of the through hole, the *inner diameter* of the first insulator stepped portion, the *inner diameter* of the rod-shaped center electrode, the *inner diameter* of the metallic shell, or the *inner diameter* of the first metallic shell stepped portion. For purposes of examination, the Examiner interprets the "inner diameter" recited in line 4 of the claim to be referring to the inner diameter of the first metallic shell stepped portion, since this interpretation appears to be consistent with applicant's disclosure.

12. Independent claim 1 also recites "a front end side" in lines 4-5 of the claim. It is unclear which element of the claim this *front end side* refers to—e.g., the *front end side* of the spark plug, the *front end side* of the tubular insulator, the *front end side* of the through hole, the *front end side* of the first insulator stepped portion, the *front end side* of the rod-shaped center electrode, the *front end side* of the metallic shell, or the *front end side* of the first metallic shell stepped portion. For purposes of examination, the Examiner interprets the "front end side" recited in lines 4-5 of the claim to be referring to the front end side of the first metallic shell stepped portion, since this interpretation appears to be consistent with applicant's disclosure.

13. Independent claim 1 also recites "an end" in line 7 of the claim. It is unclear which element of the claim this *end* refers to—e.g., the *end* of the spark plug, the *end* of the tubular insulator, the *end* of the through hole, the *end* of the first insulator stepped portion, the *end* of the rod-shaped center electrode, the *end* of the metallic shell, the

end of the first metallic shell stepped portion, the *end* of the packing, or the *end* of the ground electrode. For purposes of examination, the Examiner interprets the "end" recited in line 7 of the claim to be referring to the end of the metallic shell, since this interpretation appears to be consistent with applicant's disclosure.

14. Independent claim 1 also recites "the other end portion" in lines 7-8 of the claim. It is unclear which element of the claim this *other end portion* refers to—e.g., the *other end portion* of the spark plug, the *other end portion* of the tubular insulator, the *other end portion* of the through hole, the *other end portion* of the first insulator stepped portion, the *other end portion* of the rod-shaped center electrode, the *other end portion* of the metallic shell, the *other end portion* of the first metallic shell stepped portion, the *other end portion* of the packing, or the *other end portion* of the ground electrode. For purposes of examination, the Examiner interprets the "other end portion" recited in lines 7-8 of the claim to be referring to the other end portion of the metallic shell, since this interpretation appears to be consistent with applicant's disclosure.

15. Independent claim 1 also recites "a more front end side" in line 11 of the claim. It is unclear which element of the claim this *more front end side* refers to—e.g., the *more front end side* of the spark plug, the *more front end side* of the tubular insulator, the *more front end side* of the through hole, the *more front end side* of the first insulator stepped portion, the *more front end side* of the rod-shaped center electrode, the *more front end side* of the metallic shell, the *more front end side* of the first metallic shell stepped portion, the *more front end side* of the packing, or the *more front end side* of the ground electrode. For purposes of examination, the Examiner interprets the "more

front end side" recited in line 11 of the claim to be referring to the more front end side of the tubular insulator, since this interpretation appears to be consistent with applicant's disclosure.

16. Independent claim 1 also recites "the front end side" in line 15 of the claim. It is unclear which element of the claim this *front end side* refers to—e.g., the *front end side* of the spark plug, the *front end side* of the tubular insulator, the *front end side* of the through hole, the *front end side* of the first insulator stepped portion, the *front end side* of the rod-shaped center electrode, the *front end side* of the metallic shell, the *front end side* of the first metallic shell stepped portion, the *front end side* of the packing, or the *front end side* of the ground electrode. For purposes of examination, the Examiner interprets the "front end side" recited in line 15 of the claim to be referring to the front end side of the first insulator stepped portion, since this interpretation appears to be consistent with applicant's disclosure.

17. Independent claim 1 also recites "a rear end side" in line 16 of the claim. It is unclear which element of the claim this *rear end side* refers to—e.g., the *rear end side* of the spark plug, the *rear end side* of the tubular insulator, the *rear end side* of the through hole, the *rear end side* of the first insulator stepped portion, the *rear end side* of the rod-shaped center electrode, the *rear end side* of the metallic shell, the *rear end side* of the first metallic shell stepped portion, the *rear end side* of the packing, or the *rear end side* of the ground electrode. For purposes of examination, the Examiner interprets the "rear end side" recited in line 16 of the claim to be referring to the rear end

side of the metallic shell, since this interpretation appears to be consistent with applicant's disclosure.

18. Due to their respective dependencies upon independent claim 1, claims 2-12 are also deemed indefinite.

19. Claim 2 recites the limitation "the gap" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim. Independent claim 1 recites a "spark discharge gap" in line 8 of the claim and also recites "a gap" in line 11 of the claim. Thus, it is unclear which *gap* is being referred to line 1 of claim 2. For purposes of examination, the Examiner interprets "the gap" in line 1 of claim 2 to be referring to the gap recited in line 11 of independent claim 1, since this interpretation appears to be consistent with applicant's disclosure.

20. Claim 2 also recites "the front end side" in line 4 of the claim. It is unclear which element of the claim this *front end side* refers to—e.g., the *front end side* of the spark plug, the *front end side* of the tubular insulator, the *front end side* of the through hole, the *front end side* of the first insulator stepped portion, the *front end side* of the rod-shaped center electrode, the *front end side* of the metallic shell, the *front end side* of the first metallic shell stepped portion, the *front end side* of the packing, or the *front end side* of the ground electrode. For purposes of examination, the Examiner interprets the "front end side" recited in line 4 of the claim to be referring to the front end side of the first insulator stepped portion, since this interpretation appears to be consistent with applicant's disclosure.

21. Claim 2 also recites "a rear end side" in line 5 of the claim. It is unclear to the Examiner which element of the claim this *rear end side* refers to—e.g., the *rear end side* of the spark plug, the *rear end side* of the tubular insulator, the *rear end side* of the through hole, the *rear end side* of the first insulator stepped portion, the *rear end side* of the rod-shaped center electrode, the *rear end side* of the metallic shell, the *rear end side* of the first metallic shell stepped portion, the *rear end side* of the packing, or the *rear end side* of the ground electrode. For purposes of examination, the Examiner interprets the "rear end side" recited in line 5 of the claim to be referring to the rear end side of the metallic shell, since this interpretation appears to be consistent with applicant's disclosure.

22. Claim 3 recites "the front end side" in line 3 and line 5 of the claim. It is unclear which element of the claim this *front end side* refers to—e.g., the *front end side* of the spark plug, the *front end side* of the tubular insulator, the *front end side* of the through hole, the *front end side* of the first insulator stepped portion, the *front end side* of the rod-shaped center electrode, the *front end side* of the metallic shell, the *front end side* of the first metallic shell stepped portion, the *front end side* of the packing, or the *front end side* of the ground electrode. For purposes of examination, the Examiner interprets the "front end side" recited in line 3 and line 5 of the claim to be referring to the front end side of the second insulator stepped portion and the front end side of the second insulator stepped portion, respectively, since this interpretation appears to be consistent with applicant's disclosure.

23. Claim 7 recites "the front end side" in line 5 of the claim. It is unclear which element of the claim this *front end side* refers to—e.g., the *front end side* of the spark plug, the *front end side* of the tubular insulator, the *front end side* of the through hole, the *front end side* of the first insulator stepped portion, the *front end side* of the rod-shaped center electrode, the *front end side* of the metallic shell, the *front end side* of the first metallic shell stepped portion, the *front end side* of the packing, or the *front end side* of the ground electrode. For purposes of examination, the Examiner interprets the "front end side" recited in line 5 of the claim to be referring to the front end side of the second metallic shell stepped portion, since this interpretation appears to be consistent with applicant's disclosure.

24. Claim 12 recites "a rear end side" in line 3 and line 6 of the claim. It is unclear which element of the claim this *rear end side* refers to—e.g., the *rear end side* of the spark plug, the *rear end side* of the tubular insulator, the *rear end side* of the through hole, the *rear end side* of the first insulator stepped portion, the *rear end side* of the rod-shaped center electrode, the *rear end side* of the metallic shell, the *rear end side* of the first metallic shell stepped portion, the *rear end side* of the packing, or the *rear end side* of the ground electrode. For purposes of examination, the Examiner interprets the "rear end side" recited in line 3 and line 6 of the claim to be referring to the rear end side of the rod-shaped center electrode, since this interpretation appears to be consistent with applicant's disclosure.

Claim Rejections - 35 USC § 102

25. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

26. Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsubara (US 6,091,185).

27. Regarding independent claim 1, Figure 11 of Matsubara shows a spark plug comprising a tubular insulator (2) having an axial through hole and a first insulator stepped portion that reduces in an outer diameter of the tubular insulator toward a front end side of the tubular insulator, a rod-shaped center electrode (3) disposed in the through hole of the tubular insulator, a metallic shell (1) having a first metallic shell stepped portion that reduces in an inner diameter of the first metallic shell stepped portion toward a front end side of the first metallic shell stepped portion and supporting the tubular insulator through engagement of the first metallic shell stepped portion and the first insulator stepped portion by interposing therebetween a packing (10), and a ground electrode (4) connected at an end of the metallic shell to a front end surface of the metallic shell and facing at the other end portion and the rod-shaped center electrode, characterized in that the tubular insulator and the metallic shell, when observed in a section made by a plane including the axis of the spark plug, have therebetween a gap of less than 0.45mm ((D-A)/2) at a more front end side of the tubular insulator than an engagement position of the packing and the first insulator

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stepped portion; and the gap is provided axially from a most front end side engagement position of the packing and the first insulator stepped portion as a starting point to a finishing point that is apart from the starting point by 1.2mm or more toward the front end side of the tubular insulator while being apart from the front end surface of the metallic shell by 7.9mm or more toward a rear end side.

28. Regarding claim 2, Figure 11 of Matsubara shows the gap provided axially from the starting point to a finishing point that is apart from the starting point by 1.5mm or more toward the front end side of the first insulator stepped portion while being apart from the front end surface of the metallic shell by 9.9mm or more toward the rear end side of the metallic shell.

29. Regarding claim 3, Figure 11 of Matsubara shows tubular insulator including, at a more front end portion than the first insulator stepped portion, a second insulator stepped portion that reduces in diameter toward the front end side of the tubular insulator, the metallic shell including, at a more front end side than the first metallic shell stepped portion, a second metallic shell stepped portion that increases in diameter toward the front end side of the metallic shell, and the difference in outer diameter of the tubular insulator between a front end and a rear end of the second insulator stepped portion is larger than the difference in inner diameter of the metallic shell between a front end and a rear end of the second metallic shell stepped portion.

30. Regarding claim 4, Figure 11 of Matsubara shows the second insulator stepped portion, when observed in a section made by a plane including the axis of the spark plug, forms an included angle of 10° or more with a line parallel to the axis.

31. Regarding claim 5, Figure 11 of Matsubara shows the rear end of the second insulator stepped portion axially disposed at a more front end side than the front end of the first insulator stepped portion by an amount ranging from 1 to 6mm.
32. Regarding claim 6, Figure 11 of Matsubara shows the rear end of the second insulator stepped portion axially apart from the front end surface of the metallic shell by 7mm or more.
33. Regarding claim 7, Figure 11 of Matsubara shows the rear end of the second insulator stepped portion, when observed in a section made by a plane including the axis of the spark plug, axially apart from the rear end of the second metallic shell stepped portion as a starting point by an amount ranging from -0.5 to 3mm wherein the amount apart from the starting point toward the front end side is designated by a positive value.
34. Regarding claim 8, the Examiner notes that when the structure recited in the reference is substantially identical to that of the claim, claimed properties or functions are presumed to be inherent (MPEP § 2112.01).
35. Regarding claim 9, Figure 11 of Matsubara shows a thread portion (13) formed on an outer circumferential surface of the metallic shell and the nominal designation of the thread portion being M12 or less (col. 7, ln. 55-57).
36. Regarding claim 10, Figure 11 of Matsubara shows the axial length from a front end of the thread portion to the front end of the metallic shell being 2.5mm or more.

37. Regarding claim 11, Figure 11 of Matsubara shows the distance from the front end of the metallic shell to the most front end side engagement position of the packing and the first insulator stepped portion being 2mm or more.

38. Regarding claim 12, Figure 11 of Matsubara shows the rod-shaped center electrode including a first center electrode stepped portion increasing in outer diameter toward a rear side, a center electrode minimum diameter portion connected to a rear end side of the first center electrode stepped portion, a second center electrode stepped portion connected to a rear end side of the center electrode minimum diameter portion and increasing in outer diameter toward a rear end side, and a center electrode maximum diameter connected to a rear end side of the second center electrode stepped portion, and the front end of the tubular insulator is located between the first insulator stepped portion and the second insulator stepped portion when observed in a section made by a plane including the axis of the spark plug.

Conclusion

39. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lipp (US 2003/0214210) discloses a spark plug with tool attachment. Nishikawa (US 2003/0127959) discloses a spark plug with glaze layer. Yamaguchi (US 2003/0117052) discloses a spark plug with different diameter sections. Honda (US 2001/0002096) discloses a spark plug with particular wall thickness.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (571)272-2461. The examiner can normally be reached on M-TH (7-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minh-Toan Ton can be reached on (571) 272-2303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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12 July 2008